
HCI Outdoors: Understanding Human-Computer Interaction in Outdoor Recreation

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Abstract

HCI in outdoor recreation is a growing research area. While papers investigating systems in specific domains, such as biking, climbing, or skiing, are beginning to appear, the broader community is just beginning to form. The community still seems to lack a cohesive agenda for advancing our understanding of this application domain. The goal of this workshop is to bring together individuals interested in HCI outdoors to review past work, build a unifying research agenda, share ongoing work, encourage collaboration, and make plans for future meetings. The workshop will result in a report containing a research agenda, extensive annotated bibliography, an article about this topic and plans for unifying the community at future meetings.

Author Keywords

Nature; sport; well-being; outdoors

ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]:
Miscellaneous

Introduction

The use of interactive computing continues to expand into more human contexts—including time spent in outdoor recreation. This creates an opportunity for the HCI community to

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CHI'18 Extended Abstracts, Montreal, QC, Canada
ACM 978-1-4503-5621-3/18/04.
<http://dx.doi.org/10.1145/3170427.3170624>



Figure 1: A woman using a smart watch in the desert. The HCI community has the opportunity to investigate and explain this kind of interaction. This understanding will help us build interactive systems which enhance and enable outdoor recreation experiences. (Photo credit: Blazej Lyjak, shutterstock.)

both understand and shape the use of interactive technology in outdoors recreation.

We define outdoor recreation broadly to include many forms of activity done outdoors while not working. Outdoor recreation includes activities done in wilderness settings such as mountains, deserts or forests and includes activities done in more developed settings such as parks, cities or playgrounds. Recreation can include different forms of travel such as running, cycling, motorbiking, skiing, climbing or hang-gliding. Many other recreational objectives also fall within the scope of HCI outside such as exercise, sport, meditation, or sight-seeing.

Figure 1 shows a woman interacting with a smart watch in



Figure 2: A woman using a cell phone with an un-gloved hand in the cold in a forest. Another opportunity facing the HCI community is designing and engineering systems which are comfortable to use in outdoor environments. (Photo credit: Mila Drumeva, shutterstock.)

the outdoors. There are many reasons why she may have chosen to use a smart watch at this moment in time. She may be checking for an important phone call, checking her location, or checking her pace. As observers, we may judge her use of the smart watch as a distraction from or an enabler of her activity outdoors.

Figure 2 shows a different woman using a cell phone on a cold day in the forest. She has removed her glove to use the phone touch screen despite the cold air temperature. A different interface modality might have been a better fit for interaction in this setting.

Figures 1 and 2 highlight two important questions about HCI outdoors: what motivates people to use interactive systems outdoors? and how should interactive systems be built

for outdoor use? Answering these questions may lead to important new insights for the HCI community.

Understanding why and how to build interactive systems for outdoor recreation may encourage, enable and enhance outdoor experiences. Encouraging outdoor recreation may lead to positive personal health outcomes and may lead to positive social change such as deeper feelings of stewardship for the planet on which we live.

The merger of HCI and outdoor recreation may prove to be a happy one, but in order for that to be true much work remains to be done.

Individuals in the HCI community have recently begun to explore the role of HCI in outdoor recreation. Some of this work has involved probing an idea in a specific application area such as hiking [13, 14], skiing [6, 3], rock climbing [9, 10], or bicycling [2, 11]. Others explore design themes or lenses for specific activities such as skateboarding [12] or for specific groups of individuals such as amateur runners [8]. These efforts seem to be concentrated within pockets of researchers or labs.

Community building efforts have also been undertaken in this area, such as with NatureCHI [4, 5], UbiMount [1], and the CHI Outside SIG at CHI 2017 [7]. But many are still unaware of others working in this area and of the work they are doing.

We propose to host a workshop which will bring together experts in HCI for the outdoors. The purpose is to continue efforts to unite individuals and pockets of researchers in this area into a larger community and to identify research themes, questions, and goals to guide future work. At the workshop we also intend to make plans for future meetings.

We hope that this workshop will be a watershed event in which the community lays a foundation for future work and gatherings. We believe this foundation and organization will accelerate progress in HCI outdoors for many years to come.

Workshop Goals

Community Building

We will build on previous efforts in forming a community around this research theme. We will invite past attendees to closely related events and authors of on-topic published papers. Connections and collaborations will be encouraged as individuals learn about others with similar research interests and goals. The workshop organizers have organized many of the past closely-related events.

Establish Research Directions and Goals

Sharing of individual and group research will allow for a mapping of the design space related to HCI outdoors. This includes understanding both which areas of this space have been explored through existing work and which areas remain largely unexplored. This will help us as a community to establish clear research directions, questions, and goals moving forward.

Plan for Fostering Research Community

A final and very important goal for the workshop will be to unite around a plan to foster both the growth of the community and the growth of the research discipline of HCI outdoors. This is partially fulfilled by the other goals, but also requires careful planning for future events within the community, either standalone or in conjunction with other HCI venues. We hope that the community will rally around a single annual meeting rather than spreading our efforts over 3 or 4 meetings per year, but this will depend on the interests of attendees.

Workshop Themes

Some themes we plan to discuss at the workshop:

- Using technology to encourage more people to engage with the outdoors
- Safety (or lack thereof) when using technology in the outdoors
- Engineering solutions to environmental constraints faced outdoors
- Cultural issues associated with HCI outdoors
- The role of HCI before, during and after an outdoor activity
- Art projects which pose questions about HCI outdoors
- How to design technology which does not detract from the outdoor experience
- Designing technology which encourages users to be mindful of others' technology preferences in natural settings
- Social impacts of HCI outdoors
- Technology which enhances the natural experience
- Technology which brings the natural world into the civilized world

Organizers

Michael Jones is Associate Professor of Computer Science at Brigham Young University. He is currently studying fabrication of physical interactive devices, the role of cell

phones in hiking and the problem of labeling sensor data for use in machine learning. He participated in the organization of UbiMount 2017 and the CHI Outside SIG in 2017. Jones is the contact organizer.

Florian Daibler is a post-doctoral researcher at the German Research Center for Artificial Intelligence (DFKI). His work involves ubiquitous sports technology particularly in the context of rock climbing. He organized the UbiMount workshops in 2016 and 2017 and the CHI Outside SIG in 2017.

Jonna Häkkinen is a professor at the Faculty of Art and Design, University of Lapland, Finland. She is the founder of the NatureCHI workshop series (2016, 2017). She is currently working on unobtrusive interactions with technology in nature, and using natural materials for tangible interactions.

Keith Cheverst is a Reader with the School of Computing and Communications, Lancaster University. A significant focus of his research over the last 20 years has centered on the design, deployment and evaluation of interactive systems, in both rural and urban settings. He has recently co-organised both NatureCHI and UbiMount workshops.

Zann Anderson is a PhD candidate at Brigham Young University. His work has explored physical visualization as a method for commemorating outdoor activity. His current work centers around the role of cell phones in hiking, and future work is intended to probe this area more deeply. He helped organize the CHI Outside SIG in 2017.

Plans

Pre-Workshop Plans

We will recruit participants by contacting authors of published papers related to HCI outdoors and by contacting

past participants at events related to HCI outdoors. We will use the mailing lists generated at the past two Ubiquitous Computing in the Mountains (UbiMount) workshops, past NatureCHI meetings and last year's CHI Outside SIG. We will also publicize the workshop on social media using our CHI Outside Facebook group and two Strava groups. The organizers have access to the necessary email lists and social media groups.

Before the workshop, we will build community by inviting people to submit references to published papers related to HCI for the outdoors. These references will be collected at the workshop website and form the beginning of an extensive annotated bibliography of the field.

We will also build the community by inviting people not only to participate in the workshop, but also to join the social media groups. The workshop website will include a list of related events.

At the Workshop

The workshop day will include community building and work to frame a long term research agenda for HCI outdoors. Interaction in the program will progress from scripted to unscripted so that interactions become more meaningful and productive as participants get to know each other better.

In the morning, each participant take about 5 minutes to introduce themselves and briefly present their position paper. As part of building community, we will invite participants to include what they personally like to do for recreation outdoors. Many people working in HCI outdoors pursue some kind of outdoor hobby which influences their work. There will be time for discussion during and after these presentations.

We will then identify a broad collection of prior work in HCI

outdoors. Work in HCI outdoors is spread across many venues. We anticipate that each participant will learn about work they had not seen before. This collection will feed into the next phase of the workshop.

After these presentations, we will do a post-it note exercise in which participants categorize past work and future plans along two dimensions: time and objective. The time dimension includes before, during and after activity outdoors. The objective dimension will initially include safety, performance, participation, and sharing. Participants can add or modify objectives during the exercise. This exercise will help the community to identify ideas in the area while giving everyone a well-define way to participate.

After lunch, participants will form groups of 3 to 5 people (but will not given instructions on whom to select as group members). The groups will identify 3-5 published papers related to CHI outdoors, identify a theme from those papers and make plans to investigate that theme. The selected papers can be changed as the theme emerges. A printer will be available to create paper copies of papers as needed.

The final session will be an open round table discussion with one of the organizers taking notes. The purpose of the discussion is to frame a research agenda for the community and to make plans to further the growth of the community. This will also be a chance for the community to coalesce around a single annual meeting. The notes will become the first draft of the workshop report.

Post Workshop Plans

The workshop will produce two tangible artifacts: a workshop report and an annotated bibliography. After the workshop, the organizers take the lead in creating the workshop report on a shared document editing service (like Google docs or sharelatex) and invite workshop attendees to partic-

ipate fully in the creation and revision of the document. The report will synthesize the results of the post-it note exercise, the group research themes and the final round table discussion into a research agenda for the community. The report will be available on the workshop website.

The annotated bibliography will also be hosted at the workshop website. Creation of the bibliography will begin before the workshop. The bibliography will be extended and revised during and after the workshop. For each paper we will include a brief summary of the paper, a representative image, links to the paper in the ACM Digital Library or similar archive (if available), bibtex and endnote bibliography entries and a short list of key words.

The workshop may also result in a paper submitted to the ACM Interactions Magazine.

Website

The website is <http://www.hcioutdoors.net/>.

Call for Participation

Call for Participation

The HCI Outdoors workshop seeks to build community and develop an agenda for better understanding human-computer interaction in the outdoor recreation setting. We welcome researchers and practitioners who have experience with or interest in HCI in the context of the outdoors. Relevant interests might include applications related to outdoor recreational activities, systems for building interactive computing for outdoor recreation, and artistic or design work related to interactive computing in the outdoors.

To apply for the workshop, submit a 4 page position paper (not including bibliography) in CHI EA format, see the workshop website for details.

Position papers should include the following three items: (1) either a description of the author's past work in HCI outdoors including bibliographic references or a description of interests in this area if no prior work has been published. (2) Plans for future work related to HCI outdoors. (3) A statement of the author's position on HCI in the outdoors. Authors might consider including a hypothetical scenario which clarifies their position. Position papers will be discussed at the workshop but will not be published after the workshop.

Position papers will be reviewed by the workshop organizers. Upon acceptance, at least one author of each accepted paper must attend the workshop. All participants must register for both the workshop and for at least one day of the conference.

Planned workshop activities include reviewing prior work related to HCI outdoors, position presentations, planning for future meetings and a round table discussion of a long-term agenda for HCI outdoors. After the workshop, attendees will collaborate to complete a report, potentially for publication, and an annotated bibliography to be hosted at the workshop webpage.

More details can be found on the workshop webpage: <http://www.hcioutdoors.net>.

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